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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/055,420	01/23/2002	Xu Wu	60.1377/SDR-067	7263

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GORDON & JACOBSON, P.C.
60 LONG RIDGE ROAD
SUITE 407
STAMFORD, CT 06902

EXAMINER	
STOCK JR, GORDON J	

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 01/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/055,420	WU ET AL.	
	Examiner	Art Unit	
	Gordon J Stock	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 5-25* is/are rejected.

7)☒ Claim(s) *2-4* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 July 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. **Claim 4** is objected to for the following: "said optical fiber" lacks antecedent basis. Correction is required.

2. **Claim 23** is objected to for the following: "the well" of line 3 lacks antecedent basis. Correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. **Claims 11-12, 14 and 17** are rejected under 35 U.S.C. 102(b) as being anticipated by **Wu et al. (6,023,340)—cited by applicant.**

As for **claim 11**, Wu discloses an optical probe having a distal end comprising a substantially uniform cone with a 45 degree face relative to the longitudinal axis (Fig. 3d).

As for **claim 12**, Wu discloses everything as above (see **claim 11**). In addition, he discloses a sharp tip termination by the biconical probe (Fig. 3d).

As for **claim 14**, Wu discloses everything as above (see **claim 11**). In addition, he discloses a base adjacent cone, another cone, that tapers in diameter from a larger to a smaller diameter (Fig. 3d).

As for **claim 17**, Wu discloses everything as above (see **claim 11**). And discloses the optical probe for fluid measuring teaches that 10 to 1000 microns or 100 to 300 microns work well for fiber diameters (col. 7, lines 50-55).

5. **Claim 18** is rejected under 35 U.S.C. 102(b) as being anticipated by **Sahagen (5,526,112)—previously cited.**

As for **claim 18**, Sahagen in a probe for monitoring a fluid medium discloses an optical probe having a distal end comprising a paraboloid, a portion of a sphere (Fig. 9: ends of 4 and 5).

6. **Claims 18-19** are rejected under 35 U.S.C. 102(e) as being anticipated by **Griffin (6,246,817).**

As for **claims 18-19**, Griffin in an optical fiber probe discloses the following: an optical probe having a distal end comprising a hemisphere (Fig. 7).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

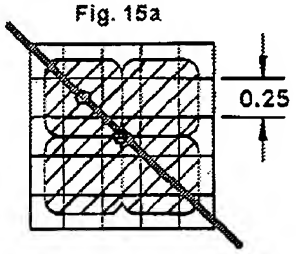
> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. **Claims 1, 5, 6, and 23** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)—previously cited.**

As for **claim 1**, Sahagen in a probe for monitoring a fluid medium discloses the following: an optical probe with a flush distal end (Fig. 14a). As for a cubical corner defined by three planes substantially perpendicular to each other and not parallel to a plane including a

longitudinal axis, Sahagen does not explicitly state this. However, Sahagen teaches with Fig. 15a a probe comprising a square end with 4 squared fibers; whereas, the longitudinal axis would pass through the center of the probe and a longitudinal axis of each squared fiber would pass through the center of each fiber; whereas, a plane including the longitudinal axis may encompass a plane passing through a line passing through the opposite corners of the probe and/or each squared fiber. See below (Sahagen: Fig. 15a): small circles represent approximate position of longitudinal axes and the diagonal line represents plane passing through longitudinal axes and not parallel to perpendicular planes:

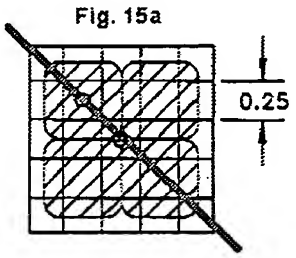
Fig. 15a



Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the system would comprise a distal end comprising a substantially cubical corner defined by three orthogonal planes and not parallel to a plane including said longitudinal axis, for a squared optical fiber used in a flush ended probe such as embodiment 14a would have a distal end comprising four substantially cubical corners each defined by three planes perpendicular to each other not parallel to a diagonal plane including the longitudinal axis.

As for **claims 5-6**, Sahagen discloses everything as above (see **claim 1** above). As for the rounded corners, Fig. 15a suggests at least one line is smoothed with the rounding of the corners, but does not explicitly state rounding at each of said three lines. However, Figs. 11 and 12 show rounding to improve collection efficiency (col. 12, lines 50-65). It would be obvious to one of ordinary skill in the art at the time the invention was made that the other two lines of the squared fiber would be rounded if squared fibers are utilized in the spherical and spherical/conical probes for smoothing occurs in the distal ends of the spherical and spherical/conical probes to improve collection efficiency.

As for **claim 23**, Sahagen discloses an optical apparatus comprising: a measurement tool comprising an elongate body that is coupled to the optical fibre probes (see Figs. 2, 6, 7, 21 with two probe configurations: Figs. 24-28). Fig. 14a is one probe arrangement for the optical apparatus. As for a cubical corner defined by three planes substantially perpendicular to each other having a longitudinal axis, Sahagen does not explicitly state this. However, Sahagen teaches with Fig. 15a a probe comprising a square end with 4 squared fibers; whereas, the longitudinal axis would pass through the center of the probe and a longitudinal axis of each squared fiber would pass through the center of each fiber; whereas, a plane including the longitudinal axis may encompass a plane passing through a line passing through the opposite corners of the probe and/or each squared fiber. See below (Sahagen: Fig. 15a): small circles represent approximate position of longitudinal axes and the diagonal line represents plane passing through longitudinal axes and not parallel to perpendicular planes:



Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the system would comprise a optical fiber having a distal end comprising a substantially cubical corner defined by three orthogonal planes and not parallel to a plane including said longitudinal axis, for a squared optical fiber used in a flush ended probe such as embodiment 14a would have a distal end comprising four substantially cubical corners each defined by three planes perpendicular to each other not parallel to a diagonal plane including the longitudinal axis. And there is a light source to provide waves for emission through the end of the fiber optic (col. 8, lines 28-30). The probe may also have fibers with paraboloidal ends, partially spherical ends (Fig. 11).

As for being placed in a well, Sahagen is silent. However, he teaches that the probes are used in harsh environments for monitoring fluid media (col. 3, lines 4-25). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the measurement tool was suspended in a well in order, for the measurement tool is used to measure fluid media in harsh environments such as a deep well.

9. **Claim 7** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)-previously cited** in view of **MacDonald (5,044,723)—previously cited.**

As for **claim 7**, Sahagen discloses everything as above (see **claim 1**). He is silent concerning a base adjacent cubical corner formed through tapering; whereas, the diameter of the

base cubical shape would decrease as it tapers to the distal cubical corner. However, MacDonald in a tapered fibre sensor teaches using tapering to enhance detection for fluids (col. 2, lines 34-55) and that square cleaved sensors are not effective probes as tapered structures (col. 1, lines 20-35); whereas, the taper conforms to the shape of the distal end (Figs. 7-8). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made have a base adjacent cubical corner of larger in diameter squared fiber that tapers to the distal end cubical corner of the squared fiber of lesser diameter in order to enhance detection of the fluid probe.

10. **Claims 8-9** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)—previously cited** in view of **MacDonald (5,044,723)—previously cited** further in view of **Friedman (5,371,826)—previously cited.**

As for **claims 8-9**, Sahagen in view of MacDonald disclose everything as above (see **claim 7**). They are silent concerning the taper being less than ten degrees or at most 5 degrees. However, Friedman in a optic light bundle conductor teaches having the taper no more than five degrees for generation of optimal convergent light with minimal light loss (col. 1, lines 50-55; col. 4, lines 3-15). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the system have a taper of at most five degrees to minimize light loss and optimize light convergence.

11. **Claim 10** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)—previously cited** in view of **Wu et al. (6,023,340)—cited by applicant.**

As for **claim 10**, Sahagen discloses everything as above (see **claim 1**). He is silent concerning the diameter being from 200 to 400 microns. However, Wu in an optical probe for fluid measuring teaches that 10 to 1000 microns or 100 to 300 microns work well for fiber

diameters (col. 7, lines 50-55). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the fiber be 200 to 400 microns in diameter, for fluid probes work well with fiber diameters between 10 and 1000 microns.

12. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Wu et al. (6,023,340)—cited by applicant** in view of **Wach et al. (6,416,234)**.

As for claim 13, Wu discloses everything as above (see claim 11). The distal cone's tip is already less than 25 percent of the width of the base cone (see Fig. 3d). He is silent concerning rounding the tip. However, Wach in couplers for optical fibers teaches rounding edges to angularly enrich the light being delivered (Fig. 64: col. 54, lines 50-53). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to round the tip to enrich the angular distribution of light delivered by the probe tip.

13. **Claims 15-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Wu et al. (6,023,340)—cited by applicant** in view of **Friedman (5,371,826)-previously cited.**

As for **claims 15-16**, Wu discloses everything as above (see **claim 14**). He shows tapering of the probe (Fig. 3d), but he is silent concerning the taper being less than ten degrees or at most 5 degrees. However, Friedman in a optic light bundle conductor teaches having the taper no more than five degrees for generation of optimal convergent light with minimal light loss (col. 1, lines 50-55; col. 4, lines 3-15). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the system have a taper of at most five degrees to minimize light loss and optimize light convergence.

14. **Claim 20** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)—previously cited** in view of **MacDonald (5,044,723)—previously cited.**

As for **claim 20**, Sahagen discloses everything as above (see **claim 18**). He is silent concerning a base adjacent paraboloid formed through tapering; whereas, the diameter of the base adjacent spherical shape would decrease as it tapers to the distal spherical end. However, MacDonald in a tapered fibre sensor teaches using tapering to enhance detection for fluids (col. 2, lines 34-55); whereas, the taper conforms to the shape of the distal end (Figs. 7-8). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a base adjacent paraboloid of larger in diameter than the distal end spherical shape that tapers to the distal end of lesser diameter in order to enhance detection of the fluid probe.

15. **Claim 20** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Griffin (6,246,817)** in view of **MacDonald (5,044,723)—previously cited.**

As for **claim 20**, Griffin discloses everything as above (see **claim 18**). He is silent concerning a base adjacent formed through tapering; whereas, the diameter of the base adjacent spherical shape would decrease as it tapers to the distal spherical end. However, MacDonald in a tapered fibre sensor teaches using tapering to enhance detection for fluids (col. 2, lines 34-55); whereas, the taper conforms to the shape of the distal end (Figs. 7-8). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a base adjacent larger in diameter than the distal end spherical shape that tapers to the distal end of lesser diameter in order to enhance detection of the fluid probe.

16. **Claim 21** is rejected under 35 U.S.C. 102(e) as being anticipated by **Griffin (6,246,817)** in view of **MacDonald (5,044,723)—previously cited** further in view of **Friedman (5,371,826)—previously cited**.

As for **claim 21**, Griffin in view of MacDonald disclose everything as above (see **claim 20**). They are silent concerning the taper being less than ten degrees. However, Friedman in a optic light bundle conductor teaches having the taper no more than five degrees for generation of optimal convergent light with minimal light loss (col. 1, lines 50-55; col. 4, lines 3-15). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the system have a taper of be less than ten degrees for a taper at most at five degrees minimizes light loss and optimizes light convergence.

17. **Claim 21** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)—previously cited** in view of **MacDonald (5,044,723)—previously cited** further in view of **Friedman (5,371,826)—previously cited**.

As for **claim 21**, Sahagen in view of MacDonald disclose everything as above (see **claim 20**). They are silent concerning the taper being less than ten degrees. However, Friedman in a optic light bundle conductor teaches having the taper no more than five degrees for generation of optimal convergent light with minimal light loss (col. 1, lines 50-55; col. 4, lines 3-15). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the system have a taper of be less than ten degrees for a taper at most at five degrees minimizes light loss and optimizes light convergence.

18. **Claim 22** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Wu et al. (6,023,340)—cited by applicant** in view of **Allison et al. (5,812,729)—previously cited.**

As for claim 22, Wu discloses a tool suspended in a well (Fig. 1: 10) with an optical probe having a distal end (Fig. 3a-3d). He is silent concerning the probe having a numerical aperture less than 0.3. He does mention probes for both reflectance and fluorescence

measurements (col. 8, lines 45-55); whereas, the fluorescent measurements comprise sufficiently diffuse light (col. 3, line 45-60). Allison in a very high numerical aperture light transmitting device teaches numerical apertures of 0.2 (Fig. 1). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the numerical aperture of the probe be less than 0.3 in order to have a narrow light collection area for reflectance detection in order to discriminate from diffuse light.

19. **Claim 24** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)** in view of **Wu et al. (6,023,340)—cited by applicant.**

As for **claim 24**, Sahagen discloses everything as above (see **claim 23**). As for having two probes of differing configurations, it is implied by Sahagen's multiple probe configurations with systems comprising at least two probes. However, he does not explicitly state having two different probes. However, Wu teaches in a well inspection system using a plurality of probes for a plurality of different measurements (Fig. 1: 30a-30d; col. 6, lines 15-30). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the system comprise two different probe configurations such as the cubical corner distal end and a paraboloidal end to ensure differing resolutions depending on functional need.

20. **Claim 25** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Wu et al. (6,023,340)—cited by applicant** in view of **Allison et al. (5,812,729)—previously cited.**

As for **claim 25**, Wu discloses a tool suspended in a well (Fig. 1: 10) with a plurality of optical probes having a distal end (Fig. 3a-3d; Fig. 1: 30a-30d) coupled to a light source (Fig. 2: 40). He is silent concerning one probe having a numerical aperture less than 0.3 and another probe having a numerical aperture above 0.8. He does mention probes for both reflectance and

fluorescence measurements (col. 8, lines 45-55); whereas, the fluorescent measurements comprise sufficiently diffuse light (col. 3, line 45-60). Allison in a very high numerical aperture light transmitting device teaches numerical apertures of 0.2 and .92 (Fig. 1). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the numerical aperture of the reflectance probe be less than 0.3 such as .2 in order to have a narrow light collection area for reflectance detection in order to discriminate from diffuse light and to have another probe have a numerical aperture of .92 in order to maximize collection efficiency for fluorescence measurements from diffuse light.

Allowable Subject Matter

21. **Claims 2-4** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to **claim 2**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an optical apparatus for investigating a fluid stream "a diagonal of said cubical corner is aligned with the longitudinal axis of said optical probe," in combination with the rest of the limitations of **claim 2.**

As to **claim 3**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an optical apparatus for investigating a fluid stream "an incident angle of light at each of said three planes is 54.73 degrees $\pm$ 1 degree" in combination with the rest of the limitations of **claim 3.**

Response to Arguments

22. Applicant's arguments, see Remarks, filed 15 October 2004, with respect to the drawing objections and the rejection of **claim 2** in the previous action have been fully considered and are persuasive. The rejection of **claim 2** under 35 U.S.C. 103(a) and the objection to the drawings have been withdrawn.

Applicant's arguments filed 15 October 2004 concerning **claims 1, 5, 6, 18, and 23** have been fully considered but they are not persuasive. As for **claim 18** in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., hemisphere distal end) is a limitation of **claim 19** and **claim 18** as written does not preclude a distal end that is paraboloidal such as the spherical ends of Sahagen's probes portions of a sphere (Fig. 9: ends of 4 and 5). As for **claims 1, 5, 6, and 23,** Examiner agrees that Sahagen's cubical corner has planes which are parallel to a plane through the longitudinal axis of the probe, a plane parallel to the sides of the square. However, the **claims 1 and 23** as written do not preclude a diagonal plane including the longitudinal axis that is not parallel to the orthogonal planes intersecting to form Sahagen's cubical corner (refer to Figure 15a in rejection of claims 1 and 23 above demonstrating the relation between a diagonal plane and the longitudinal axis).

Applicant's arguments with respect to **claims 11-14, 19, 22, 24, 25** have been considered but are moot in view of the new ground(s) of rejection.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: **(703) 872-9306**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431. The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gs
January 5, 2005

Zandra V. Smith
Primary Examiner
Art Unit 2877